

added a very complete index in two parts. The first part gives a list of the stations at which observations have been made, arranged alphabetically under the names of the countries of Europe in which they are situated; the total number of such stations is 1926. The second part consists of the names of these 1926 stations arranged alphabetically, with the years in which observations have been taken, and references to the works in which these observations are recorded. Some very curious facts may be obtained from this index. Whilst there are 315 stations in Great Britain, there are no less than 918 in Germany and Austria, and consequently 693 for the rest of Europe. But a more critical examination of the list reveals the fact that, of these 1926 stations, only 334 were taking observations in 1882, the date of the compilation of the work, and at only 97 of these 334 stations had observations been continued for ten years or more. Even this small number requires modification, for out of the 97 only 60 had observations for ten *consecutive* years, thus showing how spasmodically the subject had been treated till quite a recent date. Of the 1592 stations at which observations have ceased, there are only 210 with records of ten years and over. Considering the nature of the subject, ten years' work must be considered as the very least from which anything reliable may be deduced; whence, small as the number is compared with the large number of stations at which phenological work has been done, it is yet satisfactory to find that there is some good material to be obtained. Of late years the subject has been much more attended to, especially in England, since the Royal Meteorological Society took the matter in hand, and of the 334 stations at which observations are now taken, no less than 94 are in Great Britain and 112 in Germany.

Dr. Ihne regrets that the observations as taken for the Royal Meteorological Society refer to herbaceous rather than woody plants, and are exclusively confined to wild flowers and not to cultivated ones. His own list, which has been very generally distributed throughout Europe, has been drawn up on a different principle, and without entering into definite reasons, he condemns the Meteorological Society's list. Certainly in England, in the only case besides that of the Meteorological Society where a comparison of flowering throughout England has been tried, cultivated plants have been entirely excluded, being found by actual experience to yield no reliable results.

The second part of the work is taken up with an enumeration of the notices on the plants in the list issued by the Professors taken during the years 1879 to 1882. It would have been perhaps more convenient if they had been exhibited in a tabular form; at present it would be a work of some labour to extract the notices for the purposes of comparison.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

The Younger School of Botanists

A COMMUNICATION from the Rev. George Henslow to last week's NATURE (p. 537) concludes with the following passage:—

"There are not wanting signs elsewhere of the evil effects of the younger school of botanists not recognising the importance of first training students in a thorough course of practical and systematic botany before proceeding to laboratory work. In an examination lately held for a post at Kew, I am informed that two gentlemen who had been trained at Cambridge competed with a gardener for the post. The gardener secured it. *Verb. sap.*"

The last sentence is no doubt intended as a sort of *argumentum ad hominem*, which it may be admitted is not without a certain apparent force. Assuming for the moment the statement to be true, it must be pointed out that the only scientific posts at Kew which are open to public competition are those of assistants in the herbarium. These posts demand qualifications of a somewhat technical character, for which a general training in botany would by no means necessarily fit the candidates. I can imagine that a senior wrangler might fail in a competition for a post of computer in an observatory where arithmetical dexterity was the main thing required; a senior classic might cut an equally poor figure in seeking an appointment of library assistant if he were tested in the art of writing catalogue slips. I apprehend that in neither case would failure prove anything as regards either mathematical or classical education.

The examination to which Mr. Henslow alludes can only be one which was held by the Civil Service Commission during the past summer. There were, I believe, some dozen candidates; whether any Cambridge men were amongst them I am unable to say. But the successful candidate was not a gardener, but the laboratory assistant of the late Professor of Botany at Oxford—a gentleman whose services the present Professor is in despair at losing.

On a former occasion it is true that one of our garden staff did obtain one of these appointments in an open competition. It is not very remarkable that it should be so. Men of ability on the spot have, of course, great facilities for seeing the nature of the duties required and for qualifying themselves accordingly; furthermore they have the advantage of the lectures of my colleague Mr. Baker, which are especially directed to the branch of botany which principally occupies us at Kew.

As to the larger question raised by Mr. Henslow, I am afraid I am not wholly free from some responsibility for the proceedings of "the younger school of botanists," the effects of which he regards as evil. In the face of the successful revival in this country of many branches of botanical study which the younger school has effected, I am emphatically of the opinion that these effects are the reverse of evil. I believe I was one of the first to organise a course of so-called laboratory work in botany on lines which it is only right to say were borrowed and extended from the teaching and example of Prof. Huxley. In what I attempted I had the generous aid of many now distinguished members of the younger school. I do not doubt that they have immensely improved on the beginning that was in the first instance somewhat tentatively made. But the principle, I believe, has always remained the same, namely, to give the students a thorough and practical insight into the organisation and structure of the leading types of the vegetable kingdom. When, therefore, Mr. Henslow, himself a teacher, asserts that such laboratory teaching as this should be preceded by a thorough course of practical and systematic botany, it appears to me that he is bound to explain what he precisely means by this very dark saying. For, if botanical laboratory work in this country is not thorough, is not practical, and, in dealing with types drawn from every important group, is not systematic, it is important to know in what respects it falls short of these requirements.

W. T. HISSELTON DYER

Royal Gardens, Kew, October 4

The Solar (Dust?) Halo

THE reddish halo to which Mr. Backhouse draws attention in his letter of September 20 in NATURE (p. 511) has of late been noticed by several observers, and this I think is because, while the sunrise and sunset glows have exhibited a marked decline in their duration and brilliancy since last winter, the halo has shown no similar diminution of intensity, and thus attracts more attention relatively than it did at first, when it remained for some time almost entirely unnoticed in this country. In reply to Mr. Backhouse's question as to whether this halo has been seen in England previous to last November, I have a very strong impression that it made its first appearance here coincidently with

the arrival of the unusual sunsets last year, and that it has never been seen here before, at any rate within the last twenty years. This impression is founded, first, on the fact that, like Mr. Backhouse, I have been in the habit of frequently looking at solar halos for years past. Secondly, I have been engaged since September 8 last year in a series of observations with anemometers attached to a kite-string (latterly wire), which has naturally necessitated my frequently looking up at the sky. I remember noticing the halo in November, and calling the attention of my assistant to the beautiful salmon colour it showed in the interstices of a mackerel sky, which shut off the direct glare of the sun.

On several occasions I measured its radius with a theodolite I was using, and in every case the value came out either $22\frac{1}{2}^{\circ}$ or 23° . It must therefore be due, like the ordinary ice-halo, to refraction through hexagonal prisms. I noticed it all the way going out to America in August last, and saw it beautifully when standing on the Terrapin Bridge over Niagara Falls on August 23. A large black cloud had shut off the sun's glare, and the red border happened just to coincide with the edge of the cloud. I called the attention of some American ladies to the spectacle, which they had of course never noticed before, and which they admired immensely. I regard the sunset glows as partly an intensification of the halo, produced by the greater thickness of the stratum through which the refraction takes place when the sun is below the horizon (the sunset, in fact, being formed of the upper half of the halo which lingers behind) plus reflection from the same stratum, which can of course only come into operation when the sun shines obliquely on it. The fact of the halo remaining constant while the sunset glows have become weaker may be readily explained on the hypothesis that the stratum has gradually sunk to a lower level than it had last winter, since the duration and even brilliancy of the glow must of course vary directly with its height, whereas the halo at midday need not be sensibly altered by a variation in its level.

Three weeks ago yesterday, I saw the sun rise from the summit of Mount Washington, 6293 feet above sea-level, and at ten minutes to five o'clock saw, in addition to the usual sunrise effects, a large circle of rosy purple haze situated about 15° above the horizon, and apparently having no connection with the yellow and red horizontal bands beneath it. The morning was exquisitely fine, the only clouds being a few light streaky cirrostrati, as shown in diagram, and the air was as clear as it only can be in America. I may add that the haze circle appeared almost suddenly after the first yellowish light had been visible for twenty minutes, and as soon as the sun rose above the horizon it seemed to vanish almost entirely. I have seen the sun rise from various altitudes up to 12,000 feet, but I never saw anything so curious as this sunrise before. In fact, I went up mainly to see it, and was not disappointed.

E. DOUGLAS ARCHIBALD

Tunbridge Wells, September 27

Cole's Pits

YOUR note on the result of Gen. Pitt-Rivers' examination of the Pen Pits (Somerset) in this week's number of NATURE (p. 545) reminds me of a series of similar pits in this county of Berks, known as "Cole's Pits." They are situated near the branch of the Great Western Railway which runs from Uppington to Faringdon. I have visited them more than once when on visits to Wadley, the residence of my friend Mr. T. L. Goodlake, J.P. They correspond generally with the description given in NATURE of the Pen Pits, are probably of quite equal extent, are similarly situated on rising ground forming the cap of a ridge of hills, and are on the same Greensand formation. Many and various theories have been propounded from time to time by antiquarians, and of course the name by which these pits have been known for generations has been appealed to as connecting them with the "merry King Cole," and giving support to the views of those who regard them as traces of an "ancient British town." The utter absence of order in the arrangement of these shallow holes and rude mounds (for they are nothing more) excited my suspicion, nor could I see much in them to suggest occupation by any race which has inhabited these islands even so late as the time of the ancient Britons. On further investigation of them I came across a more modern sort of hut, consisting of a space rudely roofed over, the back of

which was cut into the side of one of these grass-grown banks. The idea occurred to me that this would help to furnish evidence, since, if these hollows were dug in the strata of the hill to be roofed over for human habitation (the notion which, I am told, finds general favour) we ought to find some traces of stratification in a section thus presented to us. Not a trace of this was to be found; the section showed nothing but a chaotic mass of rubbly material with no more order in its arrangement than is to be found in the waste heaps of any old quarry or in a terminal moraine.

So far one's first impressions of the "pits" and mounds, as of an extensive series of old disused quarries, received confirmation. I cannot hazard a conjecture as to the extent to which quern-stones may have been obtained from the "Cole's Pits"; but it seemed to me extremely likely that the range of hills in question, here so many hills on sandy formations (our Bagshot Sands, for example) owed its existence, *quâ* hills, to the protection of the hard "paw" which is so frequently met with in such formations, which I have attempted to account for in the *Proceedings* of the Geological Association (vol. viii. No. 3), and which was certainly largely worked in places for rude building construction in very early times, large masses of it being seen still in the old Roman wall which to-day completely encircles the area occupied by the ancient town of Silchester. It is possible, too, that such ironstone may have been rich enough in the metal to serve as ore, when iron "forges" were common in past centuries in the forest districts of the south of England. Further support is given to the view which I venture here to put forward as to the origin of the Cole's Pits, by the fact that lower down the hill, and at a rather lower "horizon," there is a sand-pit open in the side of the hill, in which thin bands of ironstone occur, some of which, to judge from their specific gravity, might certainly have been available as ore, under conditions which obtained in the iron industries of the country a few centuries ago.

A. IRVING

Wellington College, October 3

The Flow of Streams

THE observations made by Mr. Maw on a stream flowing into the Lake of Thun are an extremely interesting example of well-known hydraulic laws. It would be well, however, if he would tell us what was the depth of the water; from the observed phenomena I presume it was small. Mr. Smith's very ingenious mode of practically showing the different strengths of a current from surface to bottom should also be supplemented by an account of the size of the stream operated upon. The situation of the point of greatest velocity varies considerably with the conditions of the river or stream, and is by no means fixed. The observations made on some large rivers, notably those by Mr. Revy on the large rivers of South America, seem to show that the greatest velocity is, in such cases, almost, if not quite, on the surface, and that from that point it diminishes uniformly downwards to the bottom. The ratio between the surface and bottom velocities is, however, a constantly changing one, and in large rivers varies with the depth of the water. Mr. Revy's observations seem to show that in large rivers, where the influence of the banks is practically inappreciable, the surface velocity varies directly as the depth, whilst the bottom velocity varies as the square of the depth; as the depth increases, the difference between the top and bottom currents diminishes, until at a depth of about 71 feet they are practically equal. These results are borne out by the observations of Messrs. Humphreys and Abbott on the Mississippi and Mr. Gordon on the Irrawaddy. All observations to be useful, therefore, should give the size of the river or stream operated on. If Mr. Smith has not seen the diagrams given by Mr. Revy in his "Hydraulics of Great Rivers," I think he would be interested in them.

GEORGE HIGGIN

Lepidoptera

I AM at present carrying on some researches here, for which a supply of living caterpillars of such large Lepidoptera as the Death's Head, Goat, or Hawk Moth is necessary. As I have had some difficulty in obtaining these, I should feel exceedingly obliged to any of your readers who may find or possess larvae of the above or other large species, if they could furnish me with specimens.

G. LOVELL GULLAND

Zoological Laboratory, University College,
Gower Street, London, October 4